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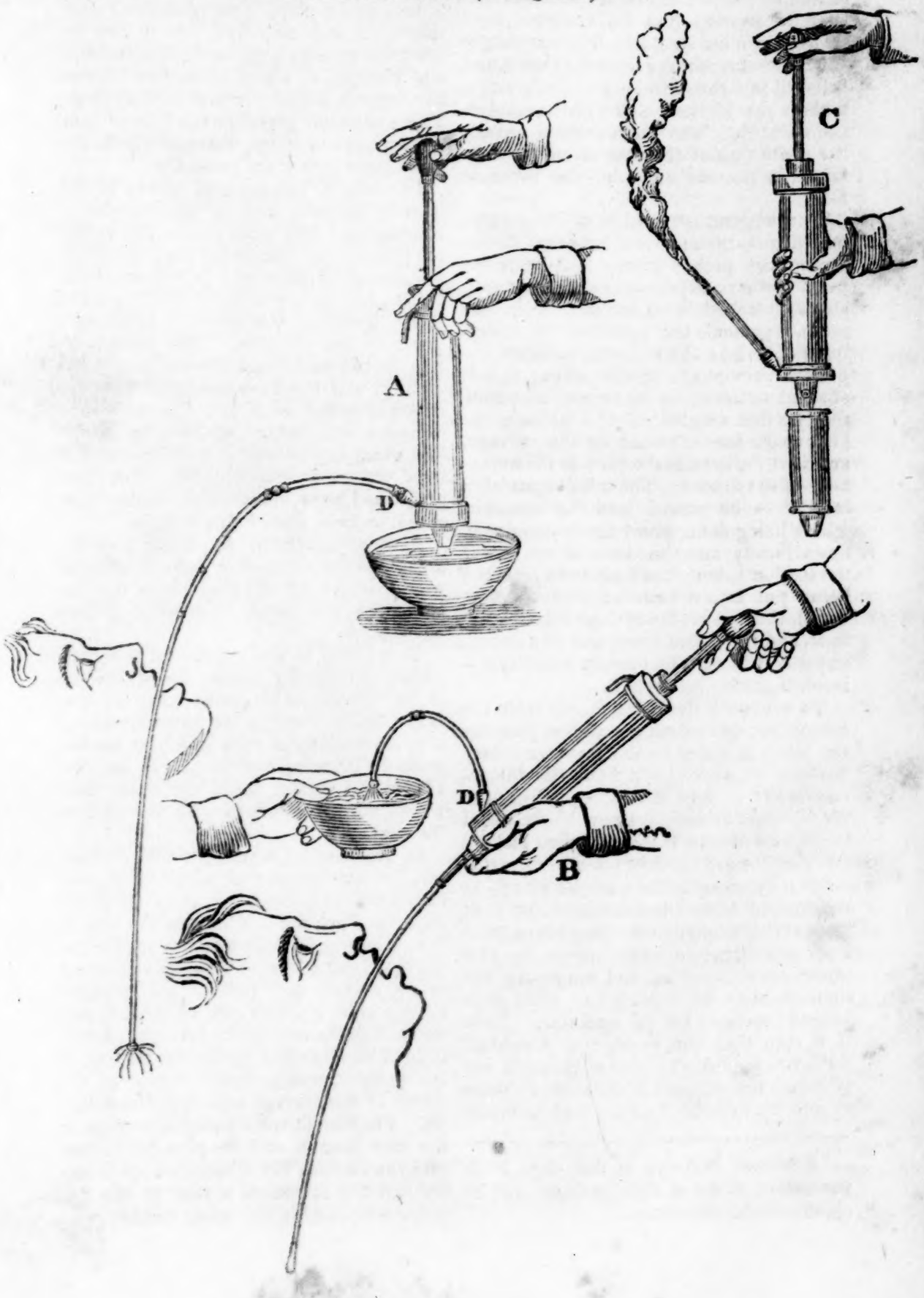
IMPROVED SYRINGE FOR MEDICAL PURPOSES.

By JOHN READ (of England.)



Mode of using the Instrument.

The œsophagus tube is first passed into the stomach; next, the two first lengths of the other tubes are fixed to the lateral branch of the syringe, and the detached brass socket being screwed to the extremity,the armed end of the œsophagus tube is inserted into it, and the fluid thrown into the stomach. The œsophagus tube is next separated from the socket, and inserted into the extremity of the syringe, when a few strokes of the piston empties the stomach. The valves which govern the operations of this instrument are contained in the chambers of the tubes, at DD.

The apparatus* consists of the pump; œsophagus tube; three leathern tubes; three ivory pipes; (these last, with the third leathern tube, are used for enemas;) and a detached brass socket. A, in the plate, represents the operation of injecting fluids into the stomach, to dilute the poison, previous to its extraction; this is effected in the following manner:—Screw the two first lengths of the leathern tubing to the *lateral* branch of the syringe, and next the detached socket, to the extremity of the former. The œsophagus tube is now to be passed into the stomach, which being done, insert the brass joint at its extremity, into the socket at the end of the leather tubes; the fluid to be injected being put into a basin or other shallow vessel, the end of the syringe is immersed in it, and the piston being put into action, any quantity may be thrown into the stomach that may be desired.

To evacuate the stomach, separate the œsophagus tube from the socket (leaving the latter attached to the leathern tubes) without withdrawing it from the throat, and insert it into the extremity of the syringe; let an assistant now hold a vessel to the end of the leathern tube, and by working the piston, the contents of the stomach may speedily be pumped into it, as is shown at B, in the drawing. By thus transferring the end of the œsophagus tube from one situation to the other, the two processes of washing and emptying the stomach may be repeated as often as is judged necessary by the operator. Thus it is seen that the syringe is furnished with two valvular apertures, through *one of which* the contents of the stomach passes into the cylinder, and are then immediately forced through *the other*, into the receiving vessel. This double operation is effected by repeated strokes of the piston, which slides so easily that an infant may use it. The manner in which the syringe is held in these two separate operations, is very important. In the first, as is seen in the plate, a perpendicular position is the most eligible; but in the second, the syringe must be held in an *inclined* position, at about an angle of forty-five degrees, with the lateral tube *upwards*. These positions preserve the valves upon their proper bearings, without which, the instrument cannot act perfectly.

In cases of retention of urine, it frequently happens that in consequence of hæmorrhage and other causes, the catheter becomes so obstructed that the bladder cannot be emptied: It was suggested by Dr. Cloquet, a celebrated Surgeon of Paris, to effect this purpose by fixing a pump to the catheter. The patent syringe performs this operation with extreme facility, and has been honoured with the entire approbation of Dr. Cloquet. For injecting the bladder, which is an operation every day becoming more frequent, it is of course equally eligible. For these purposes I have constructed elastic gum catheters to be fixed to the syringe.

As an apparatus for conveying nourishment into the stomach of persons afflicted with stricture of the œsophagus, the patent syringe is found to possess obvious advantages.

This pump is also capable of being adjusted to cupping glasses, by which any degree of exhaustion can be made the operator desires: and in the same manner it may be rendered a very effectual instrument for drawing the breasts of females. I have had glasses made for these uses, which may be obtained with the rest of the apparatus.

C, represents the syringe, with a canister, for the purpose of injecting tobacco fumes into the intestines. It is used in the following manner:—Unscrew the cap of the canister, and take out the perforated plunger; put in the tobacco (half an ounce or an ounce) and replace the plunger lightly upon it; then put on the cap and screw it to the end of the syringe; hold a lighted candle close under the bottom of the canister, and a stroke or two of the piston of the Syringe will light the tobacco. The enema tubes being now fixed to the side branch, and the pipe introduced into the rectum, the tobacco smoke is forced into the intestines as long as the Syringe is worked in the usual manner.

* Professor M'Neven of this city, is in possession of one of these syringes, and its accompanying apparatus.

I have lastly to speak of my Syringe, as an instrument for administering enemas, which was the original intention for which it was constructed, and in this point of view, it is of the highest importance.

The objects of administering Enemas, are considered to be of three kinds. 1st. For softening and diluting retained fæces. 2ndly. For stimulating the bowels and thus provoking evacuations; and, 3dly. For producing mechanical distention.

It must be obvious to every medical practitioner, how very inadequate the old Apparatus of the pipe and bladder is, to the completion of these objects; and thence it is, that various instruments have been at different times devised to remedy the deficiency; but ingenuity had been exercised in vain, and the profession were still in need of an instrument to effect these valuable ends, until the "Patent Syringe" supplied the desired object. It had hitherto been the custom of Surgeons in administering enemas to throw up three quarters of a pint or a pint of fluid, and a clyster, even in the severest cases, rarely exceeded the latter quantity. Now, by an attention to the anatomical structure of the lower intestines, it must be apparent, that such a quantity would be incapable of effecting more than a mere solution of the fœculent matter contained in the rectum, and of stimulating this bowel only; for the calibre of the rectum is so great, that under ordinary circumstances, it can of itself contain a pint of fluid. Most commonly the cause of constipation exists in the colon; how then can the disease be relieved or removed by a clyster that is expended before it reaches the part affected? An instrument was therefore wanted, that was capable of throwing up any quantity desired, in one continuous operation, and the Patent Syringe most completely effects this. Again, mechanical distention can only be effected by an instrument affording power with volume; an attention to hydraulic principles show how both these are yielded by the Syringe I have constructed. The bulk of the fluid contained in the instrument is so small, that the force necessary to propel it, scarcely requires the efforts of an infant; but the effects of these efforts, multiplied by repetition, increase to an almost infinite ratio, and at length present an overwhelming force, capable of bearing down all opposition, and overcoming all natural restraints*

In corroboration of the good effects of this instrument, the following remarks are made in Vol. 4, No. 15, page 742, of the Medico-Chirurgical Review:

"For many months past we have been in the habit of employing Mr. Read's Patent Injecting Apparatus, which is so small as to be carried in the waistcoat pocket, and so powerful as to throw fluids to a great distance. The object of our present notice, however, is to inform our readers that Mr. Read has adapted to the Instrument, a flexible elastic tube, most admirably calculated for throwing fluids into the stomach, and then extracting them, in cases of poisoning, and for administering enemas. We have attentively examined the instrument, and we know it is approved of by Sir A. Cooper, and some of the first Surgeons of the Metropolis; we think it of so much importance, that we seriously recommend it to every private practitioner."

I shall close my subject by the following explanation of the manner of using the Enema Apparatus. Fix the leathern tubes to the lateral branch of the Syringe (either two or three, as may be most convenient to the position chosen for the operation,) and put the fluid to be injected, into a wash-hand basin or other convenient vessel; the ivory pipe being inserted into the rectum, and the extremity of the Syringe into the fluid, the pump may be worked, either by the patient or some other person; but the facility with which it can be accomplished by the former, renders it truly valuable for domestic use.

* Care should be taken in using this instrument, or the intestines may be ruptured.

THE AMSTERDAM CANAL.

This is a new grand Canal, which connects the harbour of Amsterdam with the Texel, and which, for magnificence of design and for the manner of its execution, reflects high credit upon the Dutch nation.

The communication between the Texel and the port of Amsterdam has hitherto been through the Zuyder Zee, which, always a difficult and dangerous navigation, owing to numerous sand-banks, has latterly proved almost a fatal inconvenience to the commerce of that city. This noble canal is an effort towards restoring Amsterdam to all its former greatness, by enabling it to complete its natural advantages with the other commercial cities of Europe; and, al-

though only commenced about three years ago, is already in such a state of completion that ships of war, as well as merchants' ships, can now, it is said, sail directly out of the Texel, over this inland navigation, into the very town of Amsterdam. The lock into the harbour is, of course, upon an immense scale, and exhibits a beautiful specimen of workmanship, both in the masonry and the carpentry. This, and the lock into the Texel, are the only two locks upon the whole line. The canal requiring to be continued into the deep water of the harbour, was obliged to be carried out for some distance on artificial ground, supported between two large dikes or banks. But this was a difficulty to which the Dutch are accustomed, and one which they well knew how to overcome. Already this part of the work, though yet unfinished, seems to defy the utmost power of the winds and waves. The workmen being now occupied in raising these banks still higher above the water's reach, afforded the writer an opportunity of observing the mode of the proceeding, which is simply this:—The side next the water presents a smooth and regular basket-work of strong osiers, strengthened at intervals by powerful withy stakes; within this frame-work are laid, in a horizontal direction, large bundles of green osiers, as closely as they can be packed together; and a slight quantity of mould being thrown in, just sufficient to fill up the interstices, another range of similar bundles is placed transversely with the last, and over this is laid a thin layer of mould well trodden down; and thus the work proceeds, narrowing to the top, where the whole is well secured by a strong covering of clay. Thus the bank soon becomes a mass impenetrable by air or water.

CARBONATE OF COPPER.

Sir,—The Carbonate of Copper is a most valuable pigment; its expense, however, is too great as it is ordinarily manufactured;* except for the very finest green colours. Verdigris is generally substituted for it; but this contains along with the Carbonate and acetate of Copper, (its chief constituents,) a portion of oxide of Copper, which, with the partial decomposition of the acetate of Copper that follows itsuse, produces the dark muddy green colours, so very observable after this paint has been some time used. Considering its qualities, it ought never to be employed, except for the most common purposes, nevertheless it forms the basis of the green colours generally used in the United States. The arseniate of Copper, or Scheeles green, is a beautiful, permanent green pigment, but is too expensive for common purposes.

It is formed by precipitating nitrate or sulphate of Copper with saturated alkaline arseniates. In the manufature, the colours vary considerably, owing to the strength or Specific Gravity of the Coppery solution; and also to the purity and temperature of the materials at the time of their admixture: a little attention on the part of the manipulator, will readily determine the circumstances, which are requisite to produce the strongest, and best colour. In general, it is incorporated with from 5 to 800 per cent. of white lead to form a paint, which reduces its cost considerably.

The manufacture of Carbonate of Copper, has recently been effected in Europe, by placing scrap Copper alternately in weak vinegar; and in Carbonic acid gas, formed by a charcoal fire.

The process has also been modified by placing the Copper in a horizontal cylinder, caused to dip in the acidulous liquor, as it is made to rotate on its axle in a similar gas. But it appears to me, that a better mode of manufacture still remains to be put in practice. It is well known that Carbonate of Ammonia, readily acts on Copper, and with little attention to the subject; the manufacturers of animal charcoal, and Prus-

* Carbonate of Copper is at present generally manufactured in the United States by the reciprocal decomposition of the sulphate of Copper and Carbonate of potash.

sian blue may preserve, and apply a sufficient quantity of this article, in connexion with carbonic acid, to supply the place of verdigris.—In order to make it pure, it would be well perhaps to wash the gas in water by means of hydraulic or other bellows. The scrap Copper may be kept in motion by the means above described, or it may be supported by gridiron work formed of wood, so as at pleasure to be lowered into the liquid Ammonia, or raised above it, into the carbonic acid gas.

Carbonate of lead (white lead) may be prepared in the same way from litharge. In both cases the process of manufacture will be hastened by frequently agitating the materials. When thus prepared, they require to be well washed in pure water, and then dried before they are suitable for use.

SHIPPEN.

New-York, June, 1825.

N. B. One hundred parts Carbonate of Copper contain 78.5 Copper, and 21.5 parts of Carbonic acid in the solid form; and 83.5 oxide of lead, with 16.5 Carbonic acid, constitutes Carbonate or white lead, so that the increase of weight will amply compensate for the expense of fuel, if not for the manipulation in these manufactures.

STRENGTH OF ROPES.

Experiments to know whether the Strength of Cords exceed the Sum of the Forces of the threads which compose them; delivered as a Lecture before the Royal Academy of Sciences at Paris, Feb. 21st, 1711, by M. DE REAUMUR.

We are prejudiced in believing, that a cord, composed of different threads twisted together, has a force which surpasses the sum of the forces of all the threads which compose it; I mean, for example, if we make a cord with six threads, each of which will bear a weight of five pounds without breaking, that the cord made with these six threads will bear a weight above 30 pounds. Several learned men agree with the vulgar in this opinion, as I had an opportunity of seeing by the objections which were made by some of the most illustrious members of the Academy, to a passage in the Memoir in which I examined the silk of spiders. This passage treated of the strength of the filaments of silk. A skilful geometrician pretended even to have found a demonstration of the proportion in which the twisting increases the strength of the cord above the sum of the forces of all its threads. It seemed to me, on the contrary, that it was from not having examined the matter closely enough, that it had been imagined that the twisting increases the strength of the cords; that every thing being well considered, we shall find, perhaps, that, far from increasing, it diminishes it; and that this is one of those physical problems which cannot be resolved but by physical experiments, I thought it would be of some use to mechanics to endeavour to resolve them. We might often expose the cords that we make use of to be broken, if we should reckon too much upon their strength. All that is done in making cords, or in twisting the threads about one another, is to put them all in a state of contributing something to sustain the force, or the weight that is made to act on the cord, and, at the same time, to dispose each thread in such manner that it is easier to break it than to make it slip, or to disengage it from those which surround it. It is this which gives us the facility of making very long cords with very short threads, as we see in cords made of hemp, flax, wool, and silk; for we may look upon the filaments of silk and wool, which are commonly made use of, as little cords. Each thread being pressed against those that surround it, and being twisted with these threads, opposes, by its friction, such a resistance to the force which draws it, that it is more difficult for this force to overcome the resistance of the friction than to break the thread.

But does it follow, from this disposition of the threads, that the sum of their forces is smaller or greater than the forces of the cords are? It is not possible to decide this by reasoning alone. We see plainly, that in twisting several threads together, we shorten each thread, and that the cord gains in thickness what each thread loses in length. If we regard the cord only in this view, it is evident that its force is increased; for, every thing else being equal, the thickest cords are the strongest. If, for example, we make a cord by twisting five threads about one another, and the twisting shortens each thread one-fifth, it is evident that the thickness of the cord

gains five-fifths, and the length of the threads is diminished; from whence it seems evident, that the strength of this must be equal to the sum of the forces that six threads would sustain separately. There is also another way in which the twisting seems to augment the strength of the cord. The weight, which draws the cord, draws each thread obliquely, so that one part of this weight is employed to press these threads one against the other. Being each less drawn according to its length, the cord which they compose might be capable of resisting a greater effort than that which all the threads that compose it can sustain, when they are drawn perpendicularly. These are the views favourable to the twisting; but, on the other hand, we shall see that it weakens the strength of the cords. If we wish, in order to a cord's having a force equal to the sum of the forces of the threads which compose it, that the weight fastened to one of its extremities should act against each thread only in proportion to the strength of this thread, then we shall find that the twisting weakens the cord; for if the weakest threads are charged as much as the strongest, or if some threads of equal strength are much more charged than others, they will break, and the weight will fall upon the threads which before were the least charged. Now the weight that draws a cord, draws each thread that composes it, more or less, in proportion as this thread is more or less stretched, and more or less thick; and in twisting these threads, it is impossible to dispose them in such a manner that the weakest shall be less stretched than the others; sometimes the thickest are the weakest; each thread, therefore, does not contribute in proportion to its strength to support the weight. If, for example, in a cord composed of six threads, there are four which contribute only half their strength to sustain the weight, the cord must be considered as if it was only composed of four threads.

Besides, since in twisting the threads they are stretched, it is plain that the twisting is equivalent to a weight which would draw each thread, and to a weight greater or less, according as the tension that it produces is greater or less; that is, the more the thread is stretched, the less it is in a state to sustain a weight equal to that which it would sustain naturally; the twisting alone is sufficient sometimes to break the threads, as we find by experiment, when they are too hard twisted. The same twisting which increases the strength of the cords in some places diminishes it in others. But does the increase surpass the diminution? On this geometry throws no light, any farther than we make arbitrary suppositions, which consequently determine nothing. We cannot know whether, among these suppositions, we have chosen those which are conformable to the effects of nature; we must, therefore, here, as in all other philosophical doubts, have recourse to experiments. Those under consideration are simple, and easy to execute. I shall relate precisely some of those that I have made; they will teach us what we are to think of the increase in the strength of cords above that of the sum of their threads.

EXPERIMENT 1.—I took a bottom of white thread, such as is commonly used, and having cut a large piece off it, I fixed at one end different weights, from 1lb. to 10lbs. This bit of thread sustained 9½lbs. without breaking, and it broke when I had fixed to it a weight of 10lbs.; it was therefore evident, that each of the two parts which remained after the division of this thread could at least bear a weight of 9½lbs., since they had already sustained it without breaking. I afterwards doubled the longest of these ends of thread, and twisting the two pieces together, I formed a little cord, composed of two threads, each of which was able to bear 9½lbs.; consequently, if the twisting had increased the strength of the cord above the sum of the strength of the threads which composed it, this cord ought to have borne above 19lbs. It was well twisted, without being too much so; nevertheless, it broke when I had suspended a weight of 16lbs. to it, and it only sustained 15½lbs. without breaking. So far, therefore, from the strength being increased by the twisting, it was diminished about one sixth.

EXPERIMENT 2.—I afterwards fixed a weight of 6½lbs. to another thread, taken from the same bottom; it sustained it without breaking, and broke with 7lbs. I also fixed several weights to two other threads; the first of which supported a weight of 8lbs., and broke at 8½lbs.; and the second sustained 8½lbs., and broke at 9lbs. I took the longest end of each of these three threads, and twisted them into a small cord of three threads; the sum of the forces of these three threads was hypothetically capable of sustaining a weight of at least 23lbs.; the cord nevertheless broke when it was charged with 17½lbs.; the twisting has therefore considerably weakened it.

EXPERIMENT 3.—Having likewise taken four bits of thread, and knowing by the experiments that the first could sustain 8½lbs., and that it broke with 9lbs.; that the second could sustain 6½lbs., and broke with 7lbs.; and that the other two had borne 7lbs., and broke with 7½lbs., I made a cord by twisting these four threads. I knew by the experiments just mentioned, that the sum of the forces of these threads could at least sustain a weight of 29lbs.; I therefore knew that the strength of this cord was less than the strength of the sum of the threads, when I saw it break, after having hung to it a weight of 21½lbs.

EXPERIMENT 4.—To confirm the preceding experiments, I made a new cord, as above, composed of five threads, four of which had borne 7lbs., and broke with 7½lbs.; and the fifth had borne 6lbs., and broke with 6½lbs.; the sum of the strength of these threads was, therefore, at least 34lbs.; the cord, however, broke, after having for some time sustained a weight of 22lbs. As I knew by the preceding experiments, and by several others which I do not think it necessary to relate, that the thread which I made use of had, in the weakest parts, sufficient strength to sustain a weight of 6lbs., and that it was often strong enough to sustain 9lbs., I thought it right to make my calculations without examining any more the strength of the thread which I used; and that if I should find the strength of the cord less than that of the sum of the threads, by considering them as not being able each of them to sustain above 6lbs., I should not be mistaken, since I had never found the strength of these threads less, and I had commonly found them greater. I therefore again made different cords with the same thread, because we cannot too often repeat experiments before we conclude any thing from them.

(To be continued.)

GUNTER'S SCALE.

(Concluded from No. 15)

Being thus prepared, I will now endeavour to show the use of Gunter, and beg the reader to remember, that by the help of artificial numbers, called logarithms, we may perform the operation of multiplication and division by means of addition and subtraction; and by taking the half of any logarithm, we find another logarithm, which answers to the square root of the number expressed by the first logarithm, and divided into three parts, the cube root, &c.

Construction of Gunter's Line of Numbers.

Take any convenient scale (suppose one foot,) and set the distance on your Gunter equal unity. Now this is to be divided into ten parts, to correspond to the logarithms of 1-10th, 2-10ths. 3-10ths, &c. Now the logarithm of 1 10th is equal to 0; therefore the first division corresponds to the beginning of the scale (we have here nothing to do with the indices of the logarithms, which only denote whether the numbers be whole or fractional.) Now find the logarithm of 2-10ths, which is 301; take this from your scale (supposing it divided into 1000 equal parts,) and apply it to your Gunter, and you have the point marked 2. Again, the logarithm of 3-10ths is 477; take from your scale 477, and apply it to your Gunter, you have the point 3; and in this manner proceed for all the large divisions: and in the same manner lay down your small divisions to correspond to the logarithms of 1-100th, 2-200ths, 3-100ths, &c. (and if your scale will admit of it, you may find your subdivision in the same manner;) thus you will have a scale expressing the logarithms of all numbers from ·001 to unity, if your whole scale is unity; or of ·01 to 10, if your scale is 10; or from ·1 to 100, if your scale is 100; and, lastly if your scale is 1000, you will have the logarithms of all numbers from unity to 1000: and hence adding any two or more of these divisions together is the same thing as multiplying the numbers they represent on the scale, and subtracting any one from another is the same as dividing the numbers they represent on the scale, &c. Now, owing to the smallness of the divisions (even when your scale is a foot long,) those small divisions, as you approach the end of your scale, cannot be divided into more than ten equal parts. To be seen distinctly, the general practice on Gunter's scale is, from the commencement of the scale to the

point 2, to divide it into ten parts or small divisions; and again, each part to be subdivided into five parts for the subdivisions, from the 2 to the 5, each small division into two parts, and from 5 upwards cannot be divided into more than ten parts to be distinct; hence, in the use of the scale, when the compasses do not fall exactly on any division, you must estimate, as near as you can, the subdivisions.

Note.—For those mechanics who would wish to construct a Gunter's scale for themselves, I would recommend the inspection of some tables in Fergusson's Select Exercises, page 191 and following; and where they will also find full directions for the construction of the plane scale, sector, and Gunter's scale, at page 206 and following.

Use of Gunter's Line of Numbers.

Before giving some examples, I must premise, that in all the best scales, the numbers from 1 to 10 are repeated twice, and from two equal and similar scales; and that when two or more figures are used, the compasses will often extend beyond the second scale; therefore there is part of a third similar scale, if not the whole, added, which generally extends to the number 2 or 3 only; but if your rule is long enough, the whole of a third scale is very useful, particularly for the extraction of the cube root.

To illustrate the application, I shall give the solution of the examples proposed by your Correspondents J. L., G. P., and H. S. And first,

To multiply 46 *by* 54.

Place one leg of your compasses at the beginning of your scale, and extend the other to 46, that is, to four of the large divisions, and six of the next small ones; then, with that extent, place one leg on 54, that is, at five of the large divisions, and four of the next following small ones, and the other will extend to two of the larger divisions on the second scale, and four of the next following small ones, and a little more than the half of a division; which we will estimate as 80 subdivisions; that is, 2000+400 +80=2480, which is within four units of the truth, and, as before observed, in general sufficiently exact for most practical purposes; but if the scale had been large enough to show the subdivisions, it is clear we should have had the true result.

To divide 2484 *by* 46.

Calling 2 in the second or right hand scale 2000, and each of the small divisions 100, set your compasses, with the distance 46 from the first scale, on the estimated point 2484, as near as you can guess; you will find the other leg, extended backwards to the first scale, will pitch on the point shown at 5 of the large divisions and 4 of the smaller ones, which is five tens, or 50, and four units, that is, 50+4=54, the true answer.

To extract the square root of 324.

Calling the large divisions of the first scale hundreds, extend the compasses to three of the large divisions, two of the smaller ones, and estimate four subdivisions, that is, 300+20+4 =324; lay this distance down, for convenience, on a line drawn on paper, and divide it into equal parts; take one of these parts in your compasses, and placing it at the scale, you will find it extend to 18 small divisions, that is, 18 units, the answer required.

I am afraid I have extended this article to too great a length, and shall be thought prolix; but my aim has been to explain the use of the scale in a familiar manner to the workman; and though it may lay me under the censure of many versed in mathematical knowledge, it will, I am sure, be excused by those who look to the motives which induced me to be thus minute, which is, that *practical* mathemathics may be extended as much as possible among the working classes. If this plan is persevered in, it will, I am confident, be of incalculable benefit to society in general.

I am, Sir,
Your obedient servant,
G. A. S.

From the Register of Arts and Sciences.

PORTABLE GAS LAMP.

When Mr. Windsor first promulgated the idea of Gas illumination, it was generally considered as either a pleasant hoax upon the public credulity, or as the feverish result of an unsound speculation The thing was so absurd and impracticable, and its possibility so utterly destitute of all physical foundation, that it seemed to bear in itself the germs of its own refutation. The conceit, however, was sufficiently quaint and original to provoke discussion, inquiry, and calculations; and as each succeeding hour served to dissipate the ridicule, and sober down the laugh of contempt to a meditative pucker, the difficulties and the obstacles were one by one removed, till at length all London shone forth in a blaze of splendour, brilliancy and beauty.

Although this so long wished for desideratum was thus realized, it was soon found that its advantages were partial and restricted; for as it was necessary that each individual light should remain immoveably fixed, and emanate and be supplied from one great and distant source, it was consequently impossible to render it so generally available as the less effulgent flame it was now to supersede. It became, therefore, a subject of consideration to scientific men to devise some method by means of which this impediment might be gotten over, and although the accomplishment of this object must have been wrought by many an anxious experiment, and the attempt have been beset with the utmost diffculties, in making it subservient to any efficient purpose, we are happy in being now enabled to state that all these have been surmounted, and that this splendid light will in all human probability be ultimately diffused through every chamber in every house in the kingdom, whether for the purpose of domestic employment, or of artificial magnificence, by means of the PORTABLE GAS LAMP.

The merit of the invention is, we understand, solely due to Mr. David Gordon, well known to the scientific world as the projecter of many useful discoveries, and who is, we believe, the first that ever conceived the idea of bringing gas into such a high state of condensation.* When the enormous pressure to which the vessels must be subject is considered, few men would have contemplated the possibility of allowing the gas to escape with that degree of nicety, delicacy and precision, which is necessary for the purpose of ignition; but this mighty obstacle he has so completely overcome, that the flame proceeding from the lamp may be reduced from the greatest altitude to an almost imperceptible bead of light. We propose to ourselves in the next number of our work, to go more fully and particularly into the nature of the invention; limiting ourselves for the present to giving some extracts for the perusal of our readers, from the circular which has been issued by the Portable Gas Company—a company, the existence of which cannot be too generally known, and the advantage which must eventually result from it, too generally disseminated and understood.

"Thirty volumes of gas being compressed into one, no inconvenience will arise from the size of the gas lamps; and as all the reservoirs of

* A patent was taken out some years since by some person residing in the state of Rhode-Island, for supplying gas condensed into small vessels for family use. The Editor thinks that some account of this contrivance would prove interesting to the public, at this particular period.

the lamps have been proved to be able to resist upwards of 200 pounds on the square inch above the pressure to which they are to be subjected when filled with compressed gas for consumption, no possible danger can arise in the use of them.

"It is calculated that six feet of the best oil gas, will give a quantity of light equal to one pound of wax candles; and the company propose to supply regular customers with that quantity at about one half the price of one pound of tallow candles.

"The reservoirs of the gas lamps are either of a globular or cylindrical form, and the exhausted reservoirs will be daily removed by the company's servants, and replaced by others newly filled, so that regular customers will be always in possession of their required supply.

"The advantages of oil gas are, that being free from sulphurated hydrogen, it will not injure metallic goods, pictures, elegant bindings of books, or gilded furniture of any description; and will give out when burning, only one half the heat of coal gas. And the farther advantages arising from the portable form in which it is now offered, are,

"First,—That from being moveable, a less quantity of light will be required in an apartment than when the light is fixed in one place.

"Secondly,—That it is capable of being so economized, as a great or small number of lamps may be lighted, and the strength of the flame diminishedor increased at pleasure: the customer paying for no more gas than is used. And,

"Thirdly,—That the gas may be used in situations where it is impossible in any other manner to convey gas light.

"From the safety and cleanness of portable gas, it will be found particularly calculated for milliners, dress makers, tailors, lace makers, and for all manufacturers of delicate fibres, and generally for banks, public offices, coffe houses, taverns, shops, &c. as, independent of other advantages, the lamps may always be ready to be lighted upon any unforeseen emergency.

"It is proper to mention that no explosive mixture can be formed by the escape of gas from the portable gas lamps, because, to produce such, a much greater quantity of gas would be necessary, than the whole supply required for one house, even supposing all the gas in the reservoirs were at once liberated in the smallest room.

"The customers desirous to have a regular supply of compressed oil gas from the Company will fix upon the size of the lamps which are required to be furnished, and agree how often they are to be replenished; which will be done by exchanging lamps, in every respect the same, properly filled with gas, for those that are exhausted."

The Portable Gas-works are in St. John street, Clerkenwell; and their office is in Basinghall street, where we were favoured, in common with the public, with a sight of a great variety of elegant lamps filled with the compressed oil gas, which are lighted at pleasure for the satisfaction of applicants, and every circumstance relating to them clearly explained.

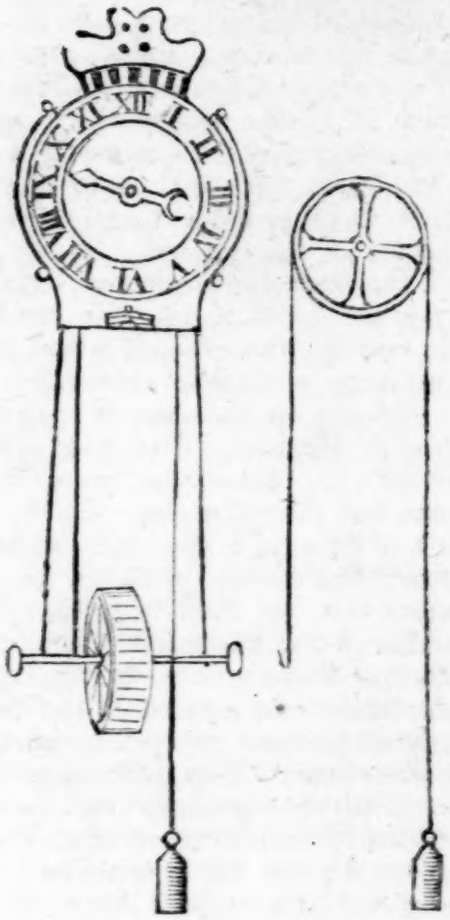
ELECTRICO-MAGNETICAL EXPERIMENT.

Mr. William Sturgeon, of Woolwich, has shown that a magnetic bar, mounted freely on its axis passing through its two poles, and in this state subjected to currents of electricity, passing from its equator or middle point towards each pole, is thereby caused to revolve on its axis.

PAINTING.

The influence of the pencil is sometimes truly wonderful:—it is said that Alexander the Great trembled and grew pale on seeing a picture of Palamedes betrayed to death by his friends, as it brought to his mind an acute recollection of his treatment of Aristonicus. Portia could bear with unshaken constancy her filnal separation from Brutus; but when she saw some hours afterwards a picture of the parting of Hector and Adromache, she burst into tears. Such are often the effects of this noble art.

ONE-WHEEL CLOCK.



Sir,—Having seen, in your work, some account of a very simple clock, *with two wheels only*, I beg leave to send you the rough draft of one in my possession, having one wheel only. It bears the name of Arnold Finchett, Cheapside, who, I understand, was a very ingenious tinman, about ninety years ago.

I am, sir, yours, &c.

B. P. C.

10 Walcot-place, Lambeth.

Description.

The case is made of tin, the face of glass, with a thin paper dial behind, the glass being perforated in the centre, through which moves the pivot of the only wheel, having an opposite pivot corresponding and running through the back of the tin case. On this spindle is fixed the tin wheel, having a groove, over which runs a fine catgut line, having a hook at one end, to which is attached a tin bottle, containing small shot. The motion to this wheel, by the moving of the line, is given by a barrel made of tin; also with a spindle passing through it, having a brass knob at the end, to which a line, also of fine catgut, is attached, and balances the barrel, being fastened at the other end of the line to the bottom of the clock case. By turning the two knobs equally between the thumb and finger of each hand, you wind the catgut round the spindle of the barrel, which will ascend as high as the bottom of the clock case; not omitting to mention, that the hollow tin barrel contains a liquor* about one quarter the contents, so that it would run down and unwind the catgut over the spindle, were it not checked by the hook, from the end of the catgut line passing over the grand wheel. The shot in the opposite end are regulated either by adding or diminishing, so as to check the descent of the barrel, and regulate the movement of the hand, which is fixed on the spindle of the wheel. This clock goes well for 24 hours, and I had it going for many weeks without losing or gaining time. There are two tin doors, which open on a hinge below the dial plate, so as to get at the inside to clean the dust; and moreover, at night, there is a small tin lamp fixed inside, in the bottom of the case, which shows the hour through the transparent face, the smoke going out at the top of the clock case, which is formed like the top of a dark lantern, and is wholly free from the noise usually attending clocks and watches in the chamber of a sick person. When the clock wants cleaning, it is only necessary to blow in it with a pair of bellows, and touch two pivots of the wheel with a feather and oil.

SCULPTURE AND ARCHITECTURE.

The origin of sculpture is of course very ancient, and its use among the Gauls, with whom it flourished, was, with the exception of the Roman states, more general than in any other country. The Celts or Gauls, before they had the least idea of the arts, erected in honour of their Gods, *Peulven* and *Dolmen*, which were rude pillars of stones piled upon each other in the form of an obelisk. The Dolmens have generally been con-

* When a boy, about forty years ago, I had the curiosity to make a fine pin hole in the barrel, to find out if it contained quicksilver; but I was disappointed, for I found nothing but a tasteless and colourless liquor, like water. I closed it up, and it does not appear to have lost any of its substance in quantity or weight ever since.

sidered as graves or altars upon which the Druids performed their sacrifices; one of these remarkable edifices still exists in Brittany, and is much resorted to by the curious. The Romans, having made themselves masters of Gaul, introduced there all the arts for which they had become famous, and was much astonished at the aptitude which they found among the vanquished, for all of them, but particularly sculpture, for which, from the first, they appeared to have a predilection. In a short time, the Gauls became more expert in the art than their masters, and specimens of their taste were exhibited, which would not probably have disgraced the present period. When the French, however, invaded Gaul, the arts fell back into the shade of obscurity and barbarism from which they had emerged, and the specimens of sculpture of the first year of the Monarchy, present only rough and incorrect forms, with an ill formed drapery. The great blow to the progress of sculpture, appears to have been in an edict issued by Charlemagne, in which he ordered its discontinuance; the Gauls had exercised all art and invention, in constructing their altars and the images which they worshipped, and being unable to gratify their mistaken ideas of religious duty, in the way consonant to their own feelings, they turned with disgust from an art, which upon such an occasion they were not permitted to exercise; the subsequent intestine wars, and the continued ravages which were made by the Normans upon the French territory, entirely overthrew all that existed to denote the improvement which had taken place in society; and the art of sculpture, the existence of which seems incompatible with a slavish or unenlightened people, fell into disuse, and under the second race of French kings, never recovered. In this deplorable state it remained, until after the Crusades. The Sovereigns, and their retainers, who had performed valorous deeds, were desirous of perpetuating them, and therefore freely rewarded all who were able to comply with their wishes; but this improvement was of short duration. Sculpture degenerated by degrees during the 14th century, until its existence was scarcely known, but under the reign of Francis the First, it threw off all the fetters which ignorance or tyranny had imposed upon it, and burst forth with a splendour which was the more dazzling, as it was utterly unexpected. At this period, the taste for sculpture became so marked, that there was not less than twenty who enjoyed a first rate reputation, and who succeeded by the exercise of their art in realizing splendid fortunes. The first sculptors of real eminence, were Paul Ponce and John Gongon. Up to the reign of Francis I, the state of architecture was as deplorable as that of sculpture; no buildings on earth could be worse designed or executed than the French; the houses were built like dove cots, and the chateaux of private gentlemen exactly like fortresses. The architecture in use, until that period, was only a remnant of the architecture of the Romans of the lower empire; the forms of which had not been at all changed in passing to an uncivilized people. Under the reign of Charlemagne, the Lombardian architecture was introduced into France. This style was at once noble and imposing, and commanded respect and attention down to the 11th century, but the subsequent ravages of the Normans removed all traces of civilization, and of course architecture fell into discredit. At the time of the Crusades, the Arabian or Saracen architecture, which is very improperly called the Gothic, was introduced into France, and into many other parts of Europe —this style of architecture was employed for a long period, as the appearance of many of our churches will testify, and it was only in the 15th century, under the reign of Louis the XIIth, that the Arabian architecture was abandoned; after this, architecture was truly Asiatic; we had a style half Lombardian, and half Arabic; this however did not last long in France, where it was introduced, or in England, where many persons of wealth had introduced

it. Under the reign of Francis I. of France, the Frenchmen seemed to soar, and the writings and buildings of the celebrated Palladio became generally admired. The monuments in France, the architecture of which was half Greek and Roman, were chiefly erected by Palladio; after this appeared several sculptors who were really eminent, viz. Lescot de Lorme, Perault, Mansard and Blondel. These great artists purified the prevailing taste, brought back art to its true principles, and raised, and gave to it a dignity and an elevation which has never been surpassed.

IMPORTANT INVENTION.

We have before had occasion to speak in this Magazine, of a very ingenious invention, by a person named Roberts, of Bolton, in Leicestershire, by means of which he is able to enter any building on fire, through a volume of suffocating smoke. The description of this invention, which was supplied to us at the time by the local prints, was, however, by no means sufficiently explicit to do justice to the inventor. We have pleasure, therefore, in copying the following from the *Manchester Guardian.*

"On Wednesday last Roberts repeated his experiments in the presence of a very considerable number of gentlemen, with the same complete success as on the former occasion; and, what fully proved that there was no trick or imposture in the plan, a number of persons besides the inventor, (we should think near a dozen) at different times entered a stove (which was filled with the densest smoke that can be conceived,) and remained shut up in it for periods quite sufficient to prove that the apparatus completely answered the purpose for which it was intended. One of the great advantages of the invention is its extreme simplicity. The apparatus consists of a leathern head-piece, which completely covers the head and face of the wearer, and buckles tight around his neck, having a piece of glass before the eyes; and opposite to the mouth is inserted one end of a leathern tube, the other end of which hangs nearly to the ground, and is attached to a tin funnel. The mode in which it operates is this: The fresh air which finds its way into a room on fire, (being cooler and consequently heavier, than the smoky atmosphere of the room) lies near the floor, and is inhaled by the wearer of the apparatus through the tube; but he would also occasionally inhale considerable quantities of smoke, were it not for a contrivance in which the principal merit of the invention consists. The tin funnel which we have already mentioned, is filled with moistened sponge, and the air cannot find its way into the tube, except by passing through the pores of that sponge, by which means the gaseous and other matters which float about in the air, and form smoke, are condensed by the water, and the air passes almost entirely pure, to the mouth of the wearer of the apparatus. Of course it is necessary that the head-piece should fit so closely round the neck as entirely to exclude air in that quarter; but in this respect some of them were rather deficient, and the wearers were a little incommoded by the smoke which found its way under the leather; but that is not the slightest drawback on the merits of the invention. Yesterday, we understand, the inventor tried his experiments afresh, in the presence of the Directors of the Manchester Assurance Company, and of Mr. Dalton, Dr. Henry, and other scientific gentlemen, who attended at the request of the directors, with the view of scrutinizing the merits of the invention.

All the parties were highly gratified with the result of the experiment; and a meeting of the directors will be held on Monday to consider the propriety of granting a sum of money to Roberts, for the invention and publication of his apparatus. We trust that their example will be followed by all the fire offices in the kingdom; and that the poor inventor will be amply and liberally rewarded for his useful discovery."

COMMON ERROR IN CHEMICAL SYSTEMS RESPECTING CAST STEEL.

In almost every chemical system published in England or France, even including the laborious compilation of Dr. Thomas Thompson, it is said that cast steel is made by melting the steel prepared by cementation, (usually called blistered steel, from the blisters on its surface) along with charcoal. This, however, is not the case, for this proceeding would produce cast iron, not cast steel.

When Dannemora or Oregrunda bar iron is heated in a close vessel, along with layers of charcoal, (a mode of operation called by chemists cementation, from its likeness to the alternate layers of bricks and cements in walls,) it absorbs part of the charcoal, at a low heat, about 70 degrees of Wedgewood's clay thermometer.

When the cementation is continued only for a short time, the iron is converted into mild blister steel, which may be easily welded with iron, at the usual welding heat of 90 degrees of Wedgewood's clay thermometer. In this state it is found to have increased in weight 4 ounces in a hundred weight, or one 448th part.

If the cementation is continued longer, the steel becomes harder; and when as hard as is possible, it is found to have increased 12 ounces in the cwt. or one 149th part. It is more difficultly welded with iron in proportion to its hardness.

By continuing the cementation still longer, it absorbs a still greater proportion of charcoal; and melts, even at that low heat, not indeed into steel, but into cast iron. How much it increases in weight when this takes place, has not been ascertained.

To form the best cast steel, some blister steel of the required degree of hardness is melted, without any addition, in a melting pot. In this state, at the usual welding heat of iron, it falls to pieces like a heap of sand,—and the parts being once separated, will not unite again by the hammer; and this red short quality is increased every time it is remelted, although the charcoal it contains is diminished each time, and, of course, it is in its passage to reform bar iron, which is so very soft and tough under the hammer.

ON THE SPEEDY DIVISION OF LINES INTO A GIVEN NUMBER OF EQUAL PARTS.

In the practice of mechanical drawing, there is frequent occasion for the division of a line into a small number of equal parts. To those who have a complete case of instruments, and are acquainted with the use of the sector, this presents no difficulty; and it is equally true, that by the methods described in the books on the use of the case, or in the treatises on practical geometry, this problem may be soon performed; yet the following method, for such ordinary cases as usually occur, is still more expeditious.

Near one edge of a card, of sufficient size, draw a line, which divide into equal parts, which should not be too small, and number them, towards the edge, from one end of the line to the other; draw a line from each of those parts to a point opposite one end of the line, and as far distant as the size of the card will admit. Your scale is then prepared, and will serve for the divison of any line, not exceeding that laid down, into any number of equal parts not exceeding those you have used.

Take the extent of the line you wish to divide in your compasses, and placing one foot on the number of parts into which it is to be divided,—let the other find some point in the line correspondent with the beginning of your scale; then draw a faint black lead line, or only place a rule edge from one point to another, and the distances of several intersections will show the value of each required part, or of any number of them.

If, when one foot of the compass is on the number of parts required, the other is not able to reach the base line of your scale, then slide the first along the line until the other foot will reach the base line, and proceed as before.

GLAZING FOR COMMON RED EARTHENWARE.

The common coarse red earthern-ware is made of brick clay; hence it is very porous, especially as it is baked with as low a heat as possible, partly in order to save the expense of fuel, and partly because common clay will not bear a high firing, without losing its shape. Hence articles of this ware must be glazed, in order to enable it to hold liquids. Litharge is commonly used for the transparent glaze, and the common potters' lead ore for the black opaque glaze. This glaze is not only apt to crack when exposed suddenly to the heat of boiling water, on account of the body of the ware and the glaze expanding of different rates; but the glaze of lead is unwholesome, even when mixed in small proportions with

earthy substances, being very soluble in vinegar, the sour juices of fruits, and in boiling fat. And when such substances are heated, or only left in these vessels of common red earthern ware, a salt of lead is formed, which, mixing with the food, produces violent cholics, and even more serious effects.

A red marl is found in beds, forming the chief part of the common soil, in many extensive districts to the north and west of a line running from Durham and Exeter. This marl is of a soft, coarse, slaty structure, easily ground, and remains suspended for a considerable time in water. The common red ware, therefore, being well dried, (but not burnt,) is dipped in a mixture of this marl with water, by which a fit surface is obtained upon which to lay the glazing. Being again carefully dried, the ware is ready for glazing.

The glaze is prepared by grinding together equal quantities of Cornish granite, (composed chiefly of felspar,) of glass, and of black magnesia: the whole is to be well ground together, and mixed with water, to the consistence of cream. The prepared ware is then dipped in this mixture, and, when thoroughly dry, it is put into the kiln, and fired in the usual way. The glazing is a solid black colour; it is very strong, and contains no ingredient that is injurious to the health. If the black magnesia is omitted, the glaze will be an opaque white.

Mr. Meigh, the inventor of this glaze, has also used a mixture of four parts of common marl, one of red marl, and one of brick clay, for making the body of the ware. It produces a reddish cream-brown ware, harder, more compact, and less porous than the common ware, and also more wholesome.

FORCING AND RETARDING FRUIT-TREES.

Sir,—Experiments have quite recently been made in England, of cultivating Pine-apples, by means of steam applied to the roots of the fruit-bearing plant, and they have been attended with complete success. It is said the process will not be expensive, and that the fruit so produced is high flavoured and delicious.

Opposed to this mode of forcing, a retarding one is practised occasionally in Vermont, where the vernal frosts frequently injure the blossoms of early fruit-trees. It consists simply in banking the snow around the trunk, and over the roots of the trees, and covering it for the purpose of preservation, with straw, &c. from the farm-houses. This snow prevents the ascent of the sap into the trees, till the season has so far advanced, that no danger is to be apprehended from the frost, and in this manner the growth of fruit is secured.

When blossoms have been frosted, the destructive consequences in respect to their posterior production of fruit, may be obviated, by wetting them freely with water before sunrise. This may be readily effected with a small garden engine, and the after production which it would secure will well compensate for the trouble.

Flora.

NAVIGATING STEAM-ENGINE.

Sir,—As your valuable Magazine is the medium for the communication of the improvements and discoveries, I send you information of a novel Steam-Engine of mine. It consists of two cylinders, each two inches in diameter internally, and ten inches externally; the cylinders are heated to the degree of being red hot; there are twelve drachms of water forced into the cylinders by means of condensed air; the water is immediately converted into steam, which gives the force of 1500 atmospheres, and works at the rate of 40 strokes a minute: 18 inches is the extent of a stroke. The whole apparatus weighs two tons and a half. The idea that the pressure of steam is in proportion with the temperature is erroneous. For instance, one cubic inch of water put into a boiler of 10,000 cubic inches, and heated to 240 degrees, gives the pressure of 20lbs. on a square inch; but when heated to the degree of red hot, the pressure is 200lbs. on a square inch; if double the quantity of water is put in, the pressure will be 600lbs. Four cubic inches of water give the pressure of 1000lbs. when the whole vessel is heated red hot.

D. Thomas.

Sir,—I should be glad to know if any of your Correspondents could inform me, through the medium of your Magazine, of the principal uses to which the common glass blow-pipe may be applied.

Yours, &c.

P. B. F.

PRESERVING POSTS.

A Pennsylvanian states, that twenty-one years ago, in planting some gate posts, he bored through them near the ground with a two inch auger, filled the hole with salt, and plugged it at both ends. The posts are now as sound as when put down. He has since applied salt to the posts of rail fences, by boring an inch auger hole about four inches above the ground diagonally across the post so as to reach about two inches under ground; filling the hole with salt, and closing it with plugs. He has not found any decay among them.

[Would it not be judicious to soak or imbue all kinds of timber which are required to be exposed to the action of the weather, in a saturated solution of common salt in water? The antiseptic properties of this and several other salts applied to vegetable as well as animal substances, are well known. They possess the property, either by displacing or neutralizing the natural juices or liquids of these substances in such manner as to prevent their agency in the decomposition or putrefaction that would otherwise follow.—Wood thus prepared must necessarily be durable, and particularly so, provided the pores at its ends have been subsequently closed with paint or any suitable composition. The quantity of salt required for such a steep would, for ordinary purposes, be very inconsiderable. The diminution would be scarcely more than what would enter between the woody fibres, and the remainder, though it should crystalize, from the evaporation of the solvent water, would be in readiness for any future operation. A wooden cistern, or any cavity in the ground, coated and well puddled with clay, if kept filled with water, may be used for effecting the steep. The salt should be pure, that is, containing no heterogeneous saline mixtures, calculated to give to wood a viscid or moist feel after it has been dried. This simple and not expensive process, it is believed, will effectually prevent the dry rot; and under this view of the subject we would particularly call the attention of the navy department, and of ship builders generally to the subject.—Ed.]

TO REMOVE SPOTS OF GREASE, PITCH, OR OIL FROM WOOLLEN CLOTH.

In a pint of spring water dissolve an ounce of pure pearl ash. This being properly mixed, must be strained, and kept in a bottle for use. A little of this liquid being poured on the stained part, is said instantaneously to remove all spots of grease, pitch, or oil, and the moment they disappear, the cloth is to be washed in clear water.

TO PREPARE PRINTER'S INK.

Put a quantity of nut or linseed oil into an iron pot, so as to half fill it; make it boil for some time, then set it on fire, and when it has burned for half an hour, put out the flame, and let it boil gently till it acquires a proper consistency. It is then to be removed from the fire, and, when cold, ground with lamp black in the proportion of two ounces and a half to sixteen ounces of oil. Vermilion or Prussian blue is used for inks of those colours.

SINGULAR FACT.

There is or lately was living at Tunbridge Wells, a Lieutenant of the Navy, named Relf, who, although he has lost one arm, and two fingers of the remaining hand, has made every article of furniture in his own house. The chests of drawers, tables, and other articles, are equal in workmanship to nine-tenths of those which are sold in the first-rate shops.

QUERE.

SIR,—I shall feel obliged to any of your intelligent Correspondents if they will inform me, through your Magazine, of the best method of bending glass.

E. J. S.

Communications for the American Mechanics' Magazine, Post paid, and addressed to

JAMES V. SEAMAN,

Broadway, New-York, will receive due attention.

William Van Norden, Printer.